Guides For Cutting Timber In the Northeast

AWI-90 APRIL 1944

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

GUIDES FOR CUTTING TIMBER IN THE NORTHEAST

Prepared by Allegheny Forest Experiment Station, Forest Service [1]

CONTENTS

Cutting practices differ for different types or kinds of forest. In the following pages, guides are given for six principal eastern-type forests. Classify your woodland according to the description it fits best. Use the timber-estimating form (p. 11) and calculate how much timber you have of each kind. Armed with this information you can talk business effectively with your buyer and be in a position to obtain a much fairer price than you would otherwise be likely to get.

Allegheny Hardwoods-Hemlock Woodland

Description of the Forest

Sugar maple, yellow birch, and beech are the characteristic elements of the Allegheny hardwoods-hemlock type of forest on north and east slopes and on plateaus; black birch and red maple are common on the west slopes. In the absence of fire, hemlock usually becomes an important part of the stand. The valuable and fast-growing black cherry, like white pine, thrives in openings caused by fire, windthrow, or clear cutting and is often accompanied by basswood, yellowpoplar, ash, and cucumber magnolia. Less desirable species are fire cherry, aspen, and hophornbeam.

If one-half or more of your merchantable volume is in beech, birch, and sugar maple, or these species plus the other desirable species mentioned, then these instructions will apply to your woodland.

Estimate the Stand

Using a form similar to that on page 11 tally all saw timber trees 16 inches stump diameter and larger, pulpwood trees 11 inches and larger, and chemical wood trees 7 inches and larger. Hardwood fuelwood is in demand—tally the crooked or limby hardwoods for that purpose.

[1] Your State forester, extension forester, local Forest Service officer, and foresters of other Government agencies can help you estimate, mark, manage, and market your trees. Seek their counsel before cutting.

Plan a 40-Percent Cut of Sawlogs

A good general rule to follow in this hardwood-hemlock type of stand is to harvest about 40 percent of the total board-foot volume. This will reduce the stand of saw timber to trees less than about 16 inches in diameter. When the volume cut is restored by growth in 10 to 18 years, a second cut yielding timber of even higher value should be possible.

In marking the stand for this cut, leave clean boled, straight trees of sugar maple, black cherry, ash, yellow birch, and other valuable hardwoods under 16 inches in diameter. Hemlock may be reserved if needed to round out the reserve stand. Free the crowns of trees that are reserved.

The stand may contain valuable veneer logs, and if the merchantable volume is made up of large logs rather than many small ones, they will cost much less per thousand board feet to cut and haul; hence, the sale value should be higher.

Some acres will be cut more heavily and some more lightly, but over about 5 acres the cut should add up to about 40 percent of the total board-foot volume. Try to leave a good thrifty tree every 25 feet, in addition to the trees under 16 inches. The space around a reserved tree should have an average diameter in feet roughly twice the tree's diameter in inches. A 12-inch tree should have 24 feet of growing space; a 16-inch tree, 32 feet, etc.

Chemical Wood and Pulpwood

Chemical wood and pulpwood should come from cleanings, thinnings, and tops, potentially valuable sawlog trees being saved for future growth.

In second-growth stands, first thinnings should be made when the largest trees are about 12 inches in diameter. Cut lightly over the whole stand, spacing reserve trees as previously mentioned and taking out large, limby, or crooked trees which crowd the stand. *Cut no trees under 8 inches in diameter unless you have time to waste.* Skid pole lengths to the haul road for bucking and piling; for distances up to about 600 feet this is cheaper than stump piling.

Approximately the same instructions apply for pulpwood. *The cost of all operations rises sharply when trees below 8 inches in diameter are cut.* Workers earn less, and the buyer of pulpwood gets less actual volume per cord.

Small Trees

Twice as much time is required to cut a cord of chemical wood from 4-inch trees as from 12-inch trees. The worker must fell forty-eight 4-inch trees to make a cord, but only about 3½ of the 12-inch trees. A cutter can produce more than 1½ times as much solid pulpwood per day from trees 8 inches in diameter and larger as from trees 5 to 8 inches in diameter.

Logging 15-inch trees requires almost double the number of man-hours per 1,000 board feet that logging 29-inch trees requires. Fifty percent more man-hours are required to log and mill 1,000 board feet from 12-inch trees than the same quantity from 24-inch trees.

577137°—44

Do Not Cut

(*a*) If your estimate shows the merchantable cordwood volume to be less than about 10 cords per acre; (*b*) if the trees under 16 inches in diameter in a saw-timber stand are spaced more than 25 feet apart on an average; (*c*) if there is less than 4,000 board feet per acre in trees 16 inches and larger—except specialty products which can be obtained by cutting here and there only a few trees of especially high stumpage value.

Eastern White Pine

Description of the Forest

Eastern white pine stands may be pure white pine, but usually have varying proportions of such species as red oak, white ash, hemlock, gray birch, and red maple.

Most white pine stands are second growth. Less than one-fourth the area in eastern white pine in the Northeastern States supports saw-timber-size trees. Under the pressure of wartime cutting, even immature stands barely large enough to make two-by-fours are often being stripped of timber. The labor and wear and tear on machinery and tires thus wasted in the pine region on trees too small to pay their way are enormous.

If half or more of the board foot volume in your wood lot is white pine, the following suggestions apply:

Estimate the Stand

Tally all trees 12 inches in stump diameter and larger. Hardwood cordwood is in demand; so cut the red maple, gray birch, and unthrifty hardwoods.

Plan a 60-Percent Cut

A good general rule in stands of eastern white pine is to cut no more than 60 percent of the total board-foot volume at one time.

A 60-percent cut in this type usually means cutting all saw timber 12 inches in diameter and larger; and, if there is a ready market for fuel wood, removing low-grade competing hardwoods. The volume harvested will be restored by growth within approximately 15 years when a second cut yielding even higher value timber should be possible.

Leave clean-boled, straight pines over 12 inches in diameter at the stump; as well as good red or white oak, ash, basswood, and hemlock, wherever these are present and are needed to round out the stand. Free the crowns of the trees that are reserved.

Large, clear, pine logs are sometimes sold for box lumber because of lack of information on markets. Such logs make the highest grades of lumber and should bring specialty prices. There may also be valuable oak ship timbers or ash handle stock in the stand. Remember that large logs cost much less per thousand board feet to cut and haul than small logs; hence, the net return is always higher.

The 60-percent cut should average out over about 5 acres. Try to leave a good thrifty tree over 12 inches in diameter every 35 feet, in addition to several small trees under 12 inches. This is usually possible with a 60-percent cut in stands running 3,600 board feet per

acre or more. A similar cut in stands having less volume leaves smaller younger trees as the reserve stand and extends the interval between successive cuts.

Small Trees

Twice as many man-hours are required to cut 1,000 board feet of logs from 6-inch as from 13-inch pine. The same applies to skidding. It takes almost three times as many man-hours to mill 1,000 board feet of 6-inch as of 12-inch logs. At least 16 percent of the labor will be saved by cutting nothing under 13 inches in diameter in the usual second-growth stands.

The value of graded lumber from 13-inch trees will be 50 percent greater than that of lumber from 6-inch trees.

A cordwood cutter can produce 2 cords from 12-inch trees in the time it takes to cut 1 cord from 4-inch trees.

Do Not Cut

(a) If your survey shows that the merchantable volume in trees 12 inches and larger in diameter is less than 1,500 board feet per acre in pine and good red or white oak, ash, hemlock, or basswood; (b) if the worth-while species between 6 and 12 inches are scanty (more than 30 feet apart on an average). For best results cut no sound pine or hardwoods under 17 inches in diameter at the stump. Thin dense young stands for cordwood, poles, or posts so as to give the best trees room to grow.

Loblolly Pine of the Eastern Shore

Description of the Forest

Loblolly pine stands of the Delaware-Maryland-Virginia peninsula often are pure, but may be mixed with pitch, pond, and Virginia pine, gum, maple, and several kinds of oak.

The suggestions that follow are applicable only if half the board foot volume or more per acre consists of pine.

Estimate the Stand

Tally all trees of 15-inch stump diameter and larger. In such a tally one man can cover about 15 to 20 acres in a day.

Plan a 50-Percent Cut

Under fairly good forest practice in loblolly pine stands, a good general rule to follow is that no more than 25 percent of the board foot volume in trees over 15 inches at the stump should be harvested in the first cutting. During the present war period, however, cutting an additional 25 percent is advocated to supply essential products. The best forest practice in normal times would be to take out 25 percent of the volume regularly every 10 years.

In marking trees to cut, select the piling and largest saw-log trees first, but also take out large hardwoods and deformed and injured trees for fuel wood, posts, and pulpwood. Leave clean-boled, straight pines, hardwoods which yield logs of veneer quality in 10 years, and the unmerchantable understory hardwoods.

Pine piling is worth three times as much as sawlogs. Basket veneer bolts of good quality bring a high price. Trees which will cut large timbers are valuable; also, large logs cost much less per thousand board feet to cut and haul.

Small Trees

Twice as many man-hours are required to cut or to skid 1,000 board feet of logs from 6-inch as from 13-inch pine trees, and nearly three times as many man-hours to mill it. You can make a labor saving of at least 16 percent by cutting no trees under 13 inches in diameter.

The value of graded lumber from 13-inch trees is 50 percent greater than that of lumber from 6-inch trees.

A cordwood cutter can produce 2 cords from 12-inch trees in the time it takes to cut 1 cord from 4-inch trees.

Young Stands

In dense thickets 20 years old or more, one-third of the volume, or 5 cords of pulpwood, can be removed in a thinning. Straight and vigorous trees should be reserved for future piling and sawlogs. Trees left should be carefully spaced to allow for plenty of growing room.

Do Not Cut

(*a*) If the merchantable volume (in trees 15 inches and larger) is less than 2,000 board feet per acre; (*b*) if worth-while trees below 15 inches in diameter are sparse (more than 20 feet apart on an average). To do so would be either unprofitable or ruinous to the stand or both.

Oak Forests in the Northeastern and Middle Atlantic States

Description of the Forest

The oak forests of this region consist almost entirely of second-growth and are the result of past heavy and repeated cutting and fires. Young stands predominate, in which sprouts make 50 to 75 percent of the stems. Repeated clear cutting has increased the proportion of inferior species of trees, and fire has increased the amount of butt rot.

Black, red, white, scarlet, and chestnut oaks; white ash and hickory; and sometimes yellowpoplar, hemlock, black locust, yellow and sweet birch, together with white, pitch, table mountain, and Virginia pines, are the valuable trees in the oak region as a whole. Table mountain and Virginia pine, however, are not found in the New England oak forests. Blackgum, dogwood, sassafras, Juneberry, aspen, post oak, and red maple are usually less desirable species common to these stands. Never are all of these found in any one woodland, however. In the border zones between oak forests and other kinds of forests, trees common to those forests will mingle and oak practices may not fully apply. To bring back the oak forest to its full possibilities requires careful handling. A trained forester should be consulted if possible.

Estimate the Stand

Tally all trees 16 inches stump diameter and larger. Keep a separate tally of trees worthless for anything but fuel wood, excluding these from the saw timber tally.

Plan a 30-Percent Cut

Cutting 30-percent of the board foot volume will take out most of the ready saw timber and poor-risk trees. The volume removed will be restored by growth within about 15 years. At that time a second cut yielding even higher value timber should be possible.

In marking the trees to be cut, select the largest ones first and take out the deformed, injured trees for fuel wood, pulpwood, and other products. Leave clean-boled, straight trees of the superior species under 16 inches in diameter at the stump. Free the crowns of trees to be reserved.

Be on the lookout for trees from which oak ship timbers, ash handle stock, or yellowpoplar veneer can be made. Don't let them go for sawlogs.

The 30-percent cut should average out over a 5-acre area. Cut clear patches of one-half acre or less in preference to leaving too widely spaced individual trees, especially in swamp hardwoods; but avoid clear cutting on any larger scale. In general, try to leave a good thrifty tree over 16 inches in diameter every 20 feet, in addition to trees under 16 inches. Cut poor-risk trees under 16 inches if you can do so without opening up the stand too much. In soft maple swamps of New England, however, cut clear with no limitation as to size.

In the "barrens" of New Jersey, pitch and shortleaf pine are far more valuable than the oak sprouts. Reserved stands should have, if possible, a 5-to-1 ratio of pine to oak in trees 10 inches in diameter and larger. Virginia and table mountain pine in western Maryland and Pennsylvania are valuable chiefly for pulpwood and should be removed before associated oaks.

Small Trees

Lumber production from 10-inch trees in this type requires 30 percent more labor than from 18-inch trees and 40 percent more than from 24-inch trees. The value of the product of 10-inch trees is usually less than two-thirds of that of 24-inch trees.

It takes almost twice as long to cut and peel 100 cubic feet of pulpwood from 5- to 8-inch trees as from 11- to 17-inch trees. A 20- to 30-percent increase in production per man-day can be had by restricting hardwood pulp cutting to trees more than 15 inches in stump diameter.

A cordwood cutter can produce 2 cords from 12-inch trees in the time it takes to cut 1 cord from 4-inch trees.

Do Not Cut

(*a*) If the merchantable volume in the better species of trees 16 inches and over is less than about 2,000 board feet per acre; (*b*) if good species under 16 inches are sparse (more than 20 feet apart on an average). To cut them would be either unprofitable or ruinous to the stand, or both. This does not mean, however, that thinning out dense stands of smaller trees for fuel wood, pulpwood, or chemical wood should not be done.

New England Hardwood Forests

Description of the Forest

In true northern hardwood stands yellow birch and sugar maple, the key trees, make up over 50 percent of the trees 6 inches or more in stump diameter. With them may be soft maple, ash, basswood, paper birch, hemlock, spruce, and pine. It is a complex kind of forest with many species. In the border zones between northern hardwoods and other types, trees common to those types will mingle and northern hardwood harvesting practices may not fully apply. To get the most out of such a forest consult a trained forester who knows markets and how to handle the different kinds of trees.

Estimate the Stand

If you are selling only stumpage, you will need to make a careful examination of the tract. If you are selling logs, a sampling cruise, or inventory, will do, but you must scale the logs after cutting. In making a careful examination, tally all trees of 14-inch stump diameter and larger. One man can cover about 20 acres in a day, if the trees average fairly large in size.

Plan a 40-Percent Cut

In New England hardwood stands a good general rule to follow is to take no more than 40 percent of the board-foot volume in a single cutting.

A 40-percent cut in this type will take out all mature saw-timber and poor-risk trees. The volume cut will be restored by growth within 10 to 15 years, when a second cut yielding even higher value timber should be possible.

Mark the trees to be cut, selecting the largest ones first and taking out the deformed, injured trees for pulpwood, fuel wood, posts, and poles. Leave clean-boled, straight trees of sugar maple, yellow birch, ash, basswood, or other valuable trees under 16 inches in diameter. If the stand runs heavily to beech, try to leave no more than half the reserve volume in this species. Take pains to protect the reserved yellow birch, since exposure to direct sun and wind may kill it. Free the crowns of trees to be reserved.

There may be valuable yellow birch or maple veneer logs in the stand. Note carefully trees which might make such logs and do not let them be sold as saw timber.

The 40-percent cut should average out over any 5-acre area. Do not clear-cut patches larger than 1 acre as doing so favors aspen, paper birch, and pin cherry. Try to leave a good thrifty tree every 20 feet. If a tree below 17 inches diameter is not available, do not hesitate to leave a larger one. This is good insurance and will pay big dividends in the next cut. Around small clear-cut patches leave more trees, spacing them 12 to 15 feet apart.

Small Trees

If the merchantable volume is made up of large logs, rather than many small ones, it will cost much less per thousand board feet to cut and haul.

Trees below 15 inches in stump diameter in this type can seldom be logged for saw timber at a profit. Lumber produced from 12-inch trees requires 30 percent more labor than that from 18-inch trees, and 40 percent more than that from 24-inch trees.

The value of lumber from 10-inch trees is usually less than two-thirds that of lumber from 24-inch trees.

It takes almost twice as long to cut and peel 100 cubic feet of pulpwood from 5- to 8-inch trees as from 11- to 17-inch trees. A 20- to 30-percent increase in production per man-day can be obtained by restricting hardwood pulpwood cutting to trees over 15 inches in stump diameter.

A cordwood cutter can produce 2 cords from 12-inch trees in the same time that it takes to cut 1 cord from 4-inch trees. Selectively cut stands will usually run about 9 logs per thousand board feet. Clear-cut stands often run 13 logs per thousand board feet. Thus clear cutting means a larger number of logs to haul and mill and handle for every thousand board feet produced.

Do Not Cut

(*a*) If the merchantable volume is less than about 1,800 board feet per acre; (*b*) if sugar maple, yellow birch, spruce, hemlock, basswood, beech, black cherry, oak, and pine under 17 inches in stump diameter and other species under 14 inches in diameter are widely spaced (more than 20 feet apart on an average) except for cutting specialty products such as veneer logs, which removes few trees but represents a high stumpage value. To make a heavier cut under these conditions would probably be either unprofitable or ruinous to the stand or both. This does not mean that young pole stands should not be thinned for fuel, pulp, or chemical wood.

Red Spruce in the Northeast

Description of the Forest

The red spruce of the Northeast sometimes occurs in pure stands, but more often is found with sugar maple and beech or yellow birch. Balsam fir is almost always present. In the true spruce type, spruce and fir make up 50 percent or more of the merchantable volume. Spruce is used primarily for pulp but also for lumber. Large, clear logs are valuable for aircraft stock.

For stands containing less than 50 percent spruce and fir, instructions for northeastern hardwoods may be more applicable.

Estimate the Stand

Tally all spruce 8 inches in stump diameter and larger and all fir 6 inches in diameter and larger on a 100-percent basis for pulpwood; and all spruce and better hardwoods 17 inches in stump diameter and larger for saw timber. In areas to be cut primarily for saw timber, thinning spruce for pulpwood down to trees 8 inches in diameter and fir down to trees 6 inches in diameter is good forestry.

Plan a 50-Percent Cut

A good general rule to follow is that no more than 50 percent of the merchantable volume should be harvested for either sawlogs or pulpwood in a single cutting.

Remember, however, that spruce and fir are shallow rooted and subject to wind throw. Only on well drained soils can a 50-percent removal be undertaken with safety. *In moister soils and in stands containing a high proportion of fir, cut only 30 or, at most, no more than 40 percent.* Some individual acres may be cut heavier and others lighter, but the average cut should be realized on any 3-acre patch.

The 50-percent cut, if feasible, will take most of the merchantable saw timber and pulpwood, and, if there is a ready market for fuel wood, the low-grade competing hardwoods should be included.

The volume removed will be restored by growth within 12 to 15 years, when a second cut yielding timber of even higher value should be possible. A cut will be necessary in less than 20 years to avoid wasting the fir, which is subject to heart rot from an early age.

In marking trees to be cut, select the largest first, but take out also any limby and rough trees not needed for seed production or to protect the reserve stand from wind along stand margins. All cutting should leave clean-boled, thrifty spruce well distributed over the area. Thin the dense groups by removing fir where possible, leaving it only where it is needed to round out the stand.

Mark the large, clean-boled spruce for sawlogs; they are often marketed for pulpwood at a loss. Also yellow birch or sugar maple logs of veneer quality should be carefully noted. Logs for aircraft veneer are, at present, bringing much higher prices than saw logs.

As hardwood cordwood is in demand, red maple, gray birch, and poor-risk hardwoods should be cut. If they are not cut, mark for girdling any undesirable trees, suppressing others you want to reserve.

Some small areas may have to be cut clear, as, for example, pure balsam fir stands in wet sites, while other stands should be barely touched. Try to keep clear-cut areas one-half acre in size or less.

Small Trees

Twice as many man-hours are required to cut or to skid 1,000 board feet of logs from 6-inch as from 13-inch trees, and almost three times as many man-hours are required to mill them.

The value of graded lumber from 13-inch trees will be 50 percent greater than that of lumber from 6-inch trees.

A cordwood cutter can produce 2 cords from 12-inch trees in the time it takes to cut 1 cord from 4-inch trees.

Do Not Cut

(*a*) If the better species are scattered (more than 20 feet apart on an average) and there is less than 2,500 board feet per acre in lumber or 5 cords in pulpwood; (*b*) if you cannot keep a reserve stand of 250 trees per acre under 6 inches in diameter in addition to half the merchantable volume.

TIMBER-ESTIMATING FORM [1]

Tree diameter class [2] (inches)	Hardwoods					Softwoods					Total number of trees	Total volume
	Board feet per tree	Cords per tree	Number of trees	Volume, board feet	Volume, cords	Board feet per tree		Cords per tree	Number of trees	Volume, board feet	Volume, cords		
						Spruce and fir	All others						
(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
6		0.10						0.02					
7		.15						.05					
8		.20						.07					
9		.25						.10					
10	42	.30				40	70	.13					
11	61	.35				65	91	.15					
12	75	.40				90	112	.18					
13	95	.48				110	141	.21					
14	114	.56				135	170	.26					
15	137	.65				160	207	.31					
16	160	.75				180	244	.38					
17	192	.85				205	282	.44					
18	224	.95				225	320	.53					
19	255	1.07				250	370	.61					
20	286	1.18				265	420	.70					
22	354					310	500	.78					
24	421					360	590						
26	500					405	690						
28	600						800						
30	700						970						

[1] Tally in columns 4 and 9 the number of trees in each diameter class. Simple multiplication will then give the board-foot and cord volumes for each class. Where values for saw timber and cordwood overlap, distinguish in your tally between timber and cordwood trees.

[2] Diameter of tree measured at breast height (4½ feet). This diameter is generally 1 inch less than stump diameter. If you choose to group your trees by two-inch classes, as 8, 10, 12, etc., remember that in classifying, diameters greater than the odd inch go in the higher class. (Example: a tree 11.1 or 13.0 inches is in the 12-inch class; one from 9.1 to 11.0 inches is in the 10-inch class.)

Scaling Logs

Measure the volume cut by using one of the following log rules. The Doyle rule is most commonly used in the East, but it benefits the buyer by giving too low a volume for logs under 28 inches in diameter. The Vermont, or Humphrey rule (diameter by ½ for 12-inch logs), commonly used on the Eastern Shore, overestimates the volume of the smaller log lengths and diameters, but underestimates logs about 16 inches in diameter and larger. The International is the fairest rule. It allows a ¼-inch saw kerf and gives the lumber content of the log resulting from careful sawing by good methods. If another rule is proposed, check it against the values given below to see how much it varies from the International rule.

INTERNATIONAL (¼-INCH) RULE

Diameter of log at small end, inside bark (inches)	Scale in board feet for log length of—				
	8 feet	10 feet	12 feet	14 feet	16 feet
8	16	21	27	33	39
10	29	37	45	54	64
12	44	57	70	83	97
14	62	80	107	117	136
16	84	108	131	156	181
18	110	139	169	201	232
20	138	174	212	251	290
22	168	215	259	307	354
24	203	257	311	367	424

DOYLE RULE

8	8	10	12	14	16
10	18	23	27	32	36
12	32	40	48	56	64
14	50	62	75	88	100
16	72	90	108	126	144
18	98	122	147	171	196
20	128	160	192	224	256
22	162	202	243	283	324
24	200	250	300	350	400

VERMONT RULE

8	21	27	32	37	43
10	33	42	50	58	67
12	48	60	72	84	96
14	65	82	98	114	131
16	85	107	128	149	171
18	108	135	162	189	216
20	133	167	200	233	321
22	161	202	242	282	383
24	192	240	288	335	383

Allegheny Forest Experiment Station
622 Bankers Securities Building
Philadelphia 7, Pa.

Forest Service
U. S. Department of Agriculture

U. S. GOVERNMENT PRINTING OFFICE: 1944